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BARRIERS TO ARTIFICIAL INTELLIGENCE IMPLEMENTATION IN HOTELS: AN INTER-CATEGORY AND INTER-DEPARTMENTAL ANALYSIS

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ABSTRACT

Artificial Intelligence (AI) has emerged as a game-changer technology in the hospitality sector, enabling automation of operations, data-driven decision making, personalized guest experiences, and above-par revenue management. Despite the strategic potential of AI applications, the adoption of AI within the hotel industry is haphazard, due to a number of organizational, financial, technological and human-related constraints. The present study focuses on the important hurdles that obstruct the widespread use of artificial intelligence technologies in select hotels of Delhi with the focus on knowing whether the perceived barriers differ significantly across of hotels star classifications and functional departments. A structured quantitative research design was used and articulation of data was obtained from 400 employees of hotels of three, four, five star and boutique properties. A purposive sampling approach was adopted and perception of the barriers to the adoption of AI was ascertained using a structured questionnaire with twelve items on barriers in the financial, technological, organizational and human resource related areas. One way Analysis of Variance (ANOVA) was applied for the testing the differences of the perceived barriers between categories of hotels and departments. The adoption barriers to AI are experienced right at the middle level but a significant level, this results show. Some of the top challenges include lack of support from top management, employee issues regarding job security, budget expenses of implementation and maintenance, lack of training, and data security and privacy. Comparative analysis reveals that there is significant statistical difference between the categories of hotels where boutique and three-fours that included in five stars perceived as the barriers more four and five. Similarly, there were significant departmental differences where the Front Office/Reception staff had experienced the most significant levels of perceived levels of challenges in comparison to the other departments. The study concludes that the adoption of AI in hotels is not only a technical improvement, but a multidimensional organisational transformation which is impacted by structural capacity, managerial commitment and workforce readiness. The outcomes of the study add to the hospitality literature as empirical evidence of variance in barriers to AI adoption between categories and departments and provide some practical observations for managers of hotels and policy-makers to come up with specific strategies considering their context for a successful integration of AI

KEYWORDS: *N/A*

1. INTRODUCTION

The notion of AI has existed in the discussion of the mass media and changed the aspect of how people conceptualize it. The development of AI is both technological and conceptual due to the fact that definitions and terms change based upon the way in which AI is discussed and introduced into society. It states that conceptualization of AI has been formed over time as a result of the incessant way of communization channels, the ideas about AI are influenced by the popularly prevailing themes, expectations and social issues. This process is the building of the foundations of AI according to emerging narratives that influence the perception, the adoption and further evolution. Therefore, AI lies on the technical improvement and dynamic interpretation of concepts (Zhai et al., 2020). The development of AI in the hospitality sector has taken place in stages, has been influenced by the development of technology and customer dynamics. First of all, the technologies in the hotel industry were on fundamental digitalization either property management systems or online booking systems. Hospitality organizations in their bid to make communication personal adopted customer relationship management and online channels with time. More recently, with AI-based systems, it is possible to do real-time personalization, automating customer engagement, as well as intelligent prediction. The given change can be related to the larger concepts of automation in tourism, with AI and robotics being in the focus of both service design and delivery (Pillai & Sivathanu, 2020). In the current market, AI makes it easier to serve the customer experience as a whole which includes inspire and plan trips, booking, in-stay, and after-stay experiences to capture the shift of the industry to streamline and experience-focused operations (Cozzio et al., 2025).

The use of AI in hotel operations also brings about serious challenges, especially in the developing and emerging market. High implementation costs, absence of trained personnel, resistance to change, terrible digital infrastructure, the issue of system integration uncertainties are barriers which hotels are usually faced with. The studies in the area of hospitality adoption have highlighted that the role of organizational barriers and decision making complexity in determining the success or failure of the implementation of advanced technologies is quite significant (Cozzio et al., 2025; Singh & Munjal, 2012). Also, AI systems require constant data collection and processing, raising the question of data privacy, cybersecurity threats, and ethics. The guests will not trust the services provided by AI because they do not know how their personal data are stored or processed, while the employees will be scared of being replaced or their work roles changed with the automatization of services (Yoong et al., 2025; Zahidi et al., 2024). Thus, motivation to research AI in the hotels selected from Delhi is founded on the understanding of the range of AI application as well as the practical issues to the practice. Determining the ways in which hotels have used AI to interact, personalize their services and management of their revenues can help to gauge at what level the technology has been integrated in the Delhi hospitality market. Similarly, analyzing limitations like training gaps, cost burden, operational disruption and trust-related problems can also inform the hoteliers and policymakers in developing more sustainable and inclusiveness of adoption of AI. Because the implementation of AI is dependent upon organizational preparedness and perception among stakeholders, empirical evaluation of the situation in the hotel of Delhi can make a contribution to the theory of hospitality and practice by highlighting the practical opportunity, and challenges of AI change (Roy et al. 2020; Cozzio et al., 2025).

The introduction of AI in the hospitality industry also brings in the efficiency in the operations but it also raises issues of workforce at the organisational level. The lack of digital preparedness makes some staff members less inclined to use AI-based tools, making them less open to change and slowing down the process of adopting the new tools. Self-service kiosks, chatbots, and smart service systems can be automated and eliminate the need for routine front-line jobs in causing anxiety over job losses. Simultaneously, AI changes the labour demand with new skills like system monitoring, data interpretation and interaction with customers with the help of technologies. This results into a constant need of training and not a one-time exercise. Hotels should also be interested in reskilling, on the job education, and organized change management programs since employees need to be able to adjust to new positions without reducing the quality of services and losing the trust of the staffs (Zahidi et al., 2024). AI in hospitality cannot be implemented by just inserting robots or smart systems, but it may require a full restructuring of services and job descriptions in the frontline. A case study on an Italian hotel about the introduction of humanoid robot, Pepper, shows that the introduction of AI presents a problem in the coordination of the workflow, the establishment of roles and the acceptance by the employees especially in cases

where the human workers must assist, control or correct the technology whenever they are faced with a service encounter. It may be that front line employees may feel more pressure as they are forced to balance between old fashioned interaction with the guests and new technical duties. The transition also means why the continuous training, digital skills and change management is increasingly needed because it can help employees efficiently work with AI and maintain the quality of services and customer's satisfaction (Mingotto et al., 2020).

2. REVIEW OF LITERATURE

Mir et al., (2020) examined how artificial intelligence is emerging and growing in the context of Industry 4.0. In the 18th century the first industrial revolution was started on gas with steam power. In the 19th century electricity took over and in the 20th century it was computers that took over. Every revolution caused massive changes in the economy and the society in which people became more productive and wealthy than they ever were. Computers were superseded by relatively more advanced technologies such as AI, cloud computing, smart robots and IoT in the fourth wave of technological change. These technologies are all a part of Industry 4.0. People believed that this revolution will have a greater impact than steam engines, electricity or computers. People have defined artificial intelligence differently from time to time. Some definitions focus on the way that it is a branch of computer science which attempts to replicate biological intelligence through reasoning, learning and adaptability. This field originated from challenges faced in the field of creating a sustainable ecosystem for new technologies. These challenges stress the need for policy-oriented research to understand the utilisation and impacts of artificial intelligence on individuals, organisations and governments.

Wang et al., (2025) The study examined the impact of employee and AI characteristics on the service performance of hotel employees by partial least squares structural equations modelling and the necessary condition analysis. The results indicated that competence and understanding of AI are critical preconditions to establish trust in AI which play an important role in shaping this trust. Privacy concerns were not particularly influencing AI trust. The research has found that both AI trust and the perceived support from supervisors were required for the performance of service to be enhanced. Supervisor support had an effect on improvisation and AI trust as well as on role uncertainty and AI trust. While improvisation had a positive impact on performance in both internal and external services role ambiguity had a detrimental impact on these outcomes. The issues raised in this study point out that employees could often times lack skills, competence and understanding around AI, which was hindering trust and effective collaboration with AI systems, even in the face of the growing usage of AI in the hotels industry. Most research that exists has been focused on AI applications used by customers rather than those used by employees. The study highlighted that it is challenging to build trust in AI, but it is important in order to improve the way that employees work with AI, in addition to raising the quality of service. It also found understanding both what helps, such as AI skills and knowledge as well as what gets in the way, such as being uncomfortable and unsure. The research revealed that support from supervisors, trust, flexibility, and clear job roles can help the hospitality industry grow and remain sustainable by making AI integration more effective.

Divya et al., (2024) indicated that the sampling technique was used to select the employees from service oriented companies in Delhi ncr region. A survey of 150 senior management employees was conducted, out of which, only 56 responses were received which amounted to 37.33%. One study used "Partial least squares structural equation modelling" PLS-SEM to analyse data that was obtained. They found out that artificial intelligence had desirable effect on the engagement of employees and leadership was a moderating variable. After the addition of leadership as mediator, the researcher made an observation that does the impact of the indirect effect although adverse and relieving the intensity of the total effect, but the model has added its explanatory power. The results also hit home regarding the concept that AI-supported leadership could improve both the experience and motivation of staff, in addition to overall engagement, along with increased productivity. It was suggested that organisations can use these insights to develop employee empowered strategies and reduce turnover by not eliminating human resources but inculcating AI.

Hajal & Yeoman, (2024) assessed the potential impact of artificial intelligence (AI) integration on the future of talent management in the tourism and hospitality sectors using a combination of the scenario planning method and Dator's Alternative Futures Framework; Four alternative scenarios for the year 2035 were developed which were to be used as the foundation for three group sessions and thirty individual scenario planning sessions with international industry experts and academics.

Thematic Analysis Focused on the Value of Fair Integration of AI that Does not Rob Humans of their Jobs but Makes them Better Among the big themes, they mentioned the relevance of having ethics, the humanistic nature of the tourism and hospitality industry, and also the need for people to continue their education and to be retrained to meet the demands generated by the advances in AI. The paper has contributed through its conceptual framework which appreciates the incorporation of AI in talent management to fill the gap noticed in the literature whereby the current theories have been too particular or not substantive to the realities of the industry. This model has strategic, ethical, organisational and personal dimensions considering that the adoption of AI should strengthen the talent management practice but without affecting the welfare of the employees nor with the ethical principles. The study was also fruitful in contributing to theory as it started a new direction of talent management based on AI and introduced to the organisations practical pieces of advice on how to implement AI in reliable, ethical ways, without losing the main human component of the industry.

Gajić, Ranjbaran, et al., (2024) investigated the effects of artificial intelligence (AI) on the perception and behaviour of customers in the hospitality industry of Iran in restaurants, airlines and hotels. The key objective was to examine the effect of the adoption of AI technology on customer trust, customer engagement level with the brand, electronic word of mouth (eWOM), and the willingness of tourists to utilize AI technologies. Hypothesis testing related to relationships between the quality of AI information, the quality of AI systems and the results of the customer interaction in the form of trust, brand loyalty and eWOM were performed using a comparative analysis, as well as a survey-based methodology. The results indicated the large positive correlations between how well AI were interacting with customers and how their customer engagement scores were. Good AI systems had been associated with better trust, better brand loyalty and willingness to use AI-based services. These findings provided a basis of how the customers can be understood and predicted to behave towards technological advancements in the hospitality industry. Stimulus-organism-response (SOR) as the theoretical model was used where the AI devices emerged as stimuli which affected cognitive, emotional and behavioural changes in tourists.

3. OBJECTIVE OF THE STUDY

The current study is an attempt to systematically explore the challenges and barriers that prevent the widespread use of Artificial Intelligence (AI) technologies in selected hotels. In recent years, AI has become a game-changer in the hospitality industry, making it possible to automate operations, utilize data for decision-making, personalize guest experiences, and optimize revenue management. However, despite its potential benefits, the adoption of AI technologies for the hotel industry still remains uneven and limited by various organizational, financial, technical, and human-related barriers. Therefore, the main aim of this research is to identify and study the challenges that lead to limit AI implementation at the organizational level. The study also aims to analyze whether there are any significant differences between these perceived barriers according to the different categories of hotels such as three star hotel, four star hotel and five star hotel. Additionally, it aims to know whether there is any variation in perception of challenges in implementing AI between functional departments such as front office, housekeeping, food and beverage, sales and marketing, revenue management, information technology and guest relations. By comparing perceived barriers between hotel categories and departments, the study hopes to gain a greater understanding of differences in the structure and operation of hotels that influence the adoption of AI. Ultimately, the endeavour aims at producing empirical insights that can help managers of hotels and policy makers as well as industry players in coming up with more focused strategies to unlearn the constraints of adopting and in effect integrating the AI technologies within the hospitality industry.

4. RESEARCH METHODOLOGY

The current research work uses systematic, structured and quantitative approach to ascertain methodology rigor and logical congruence between the research problem, research objectives, research hypotheses, data collection method and data analytical method. The research framework is based on the growing integration of Artificial Intelligence technologies in the hospitality industry and the need to know the barriers at the organizational level that affect their adoption. A survey-based methodology was deemed suitable, the aim of this study is to measure the perceptions of employees as far as the challenges associated with the implementation of AI in hotels are concerned. The target population of the study was the hotel employees who work in selected hotels working in Delhi. Employees included managerial and operational individuals from a variety of functional divisions such as front office, house-keeping, food and beverage, sales and marketing,

revenue management, information technology and guest relations. These respondents had been chosen based on being directly involved with operational processes and likely to experience or observe the implications of the practical deployment of AI within their respective departments.

The selection of hotels has been carried out by means of a purposive sampling technique, based on predefined inclusion criteria. Hotels were eligible for inclusion if they had deployed or were deploying AI-based or advanced digital technologies in one or more operational areas of the hotel or if they were working on implementing digital technologies, including: front office automation; self-service kiosks; AI-enabled revenue management systems; digital guest interface; or AI-driven customer engagement tools. In order to be diverse and comparable, hotels that were of different star categories (three-star, four-star, five-star, and boutique properties) were included in the study. Practical considerations such as accessibility, managerial consent, and willingness to participate were also considered. The identities of the hotels involved were kept confidential in order to uphold ethical standards and integrity in the research. A non-probability purposive sampling technique was applied in selecting employees in the selected hotels. Primary data were collected dissecting structured questionnaire as per specific sections relating to the study object of barriers to adoption of AI. The instrument contained a separate section with 12 items related to financial, technical, organizational, and human-related barriers. These items included issues like high costs of implementation, system integration challenges, insufficient technical infrastructure, resistance to changes by employees, lack of technical expertise, data privacy concern, lack of training, and low managerial support. All items were rated on a five-point Likert scale from 1 (Not at all) to 5 (To a very large extent), giving respondents the opportunity to ratify the degree to which each factor would be considered a barrier.

Data collection was conducted in an organized manner that was ethically responsible. Respondents were told about the purpose of the study and confidentiality and anonymity were assured. The data that was collected was coded and entered into statistical software to be analyzed. In order to investigate the hypotheses, differences in perceived barriers among the hotel categories (H1a) and among the departments (H1b) were tested using One-Way Analysis of Variance (ANOVA). Where statistically significant differences were found, post hoc tests were performed to show the groups between which there were differences. These analytical procedures had facilitated the research to find out the structural and departmental variations in the challenges of adopting AI and thus derive meaningful findings relating to the patterns of organizations and contextual factors that influence the implementation of Artificial Intelligence in the hotels.

5. ANALYSIS AND RESULTS

In this paper, the barriers to AI adoption were investigated from the perspective of hotel staff members, as they are directly involved in the implementation of the operational process and are often end users or enablers of AI-enabled systems to implement. A set of structured statements (D1-D12) were used in the employee questionnaire to receive perceptions relating to the technological, financial, organizational, and human-resource related barriers to AI adoption. The results obtained through this objective provide important insights regarding the practical limitations faced by hotels in its implementation of the AI solutions and provides a basis to build a foundation for proposing policy-level, managerial and technological interventions for more effective adoption of AI solutions in the hospitality sector.

5.1. Descriptive Analysis of Challenges and Barriers to AI Adoption

To get an insight on the most important challenges and barriers that prevent the use of AI-based technologies in selected hotels, descriptive statistics were calculated for twelve statements related to barriers (D1-D12). These items reflect employee perceptions of financial, technological, organisational, and human-related constraints that are linked to the implementation of AI.

The descriptive statistics of the challenges and barriers against the adoption of AI is presented in the Table 1. The mean scores of the barrier items vary from 3.06 to 3.19 which mean that the employees perceive that challenges in AI are moderate in nature and are not very severe. This implies that despite adoption of AI not being viewed as overwhelmingly difficult, there is a number of enduring barriers that have continued to limit widespread and effective adoption of AI. Of the barriers found, lack of support or commitment of top management was on the top place (Mean = 3.19). This finding emphasizes the significance of participation in leadership and strategic leadership in AI adoption promotion in the hotel industry. Closely attached to this, the issues of Job security, fear of Job reduction because of the AI were also highly perceived (Mean = 3.18) - implying apprehension among the employees about the possibilities of Job displacement caused by AI.

Financial and operational barriers were also at the moderate level. High ongoing costs of maintenance, upgrades and licensing (Mean = 3.15) and high initial investment costs (Mean = 3.14) reflects economic constraint of the hotels, especially in adoption of heightened AI solutions. Additionally, the difficulty of incorporating AI solutions with existing hotel systems such as PMS, POS and CRS was experienced as a notable technological barrier (Mean = 3.14) the implied infrastructural and compatibility challenges. Human-resource related problems were also in evidence. Employees have a resistance towards use of AI based technologies (Mean = 3.17) employee do not have proper training to deal with AI systems (mean= 3.13) which made out for the need for skill development and change management for effective implementation of the AI systems. Data related issues cropped up also as meaningful barriers. Concerns with data security aspects and cyber risks (Mean = 3.18) and guest privacy issues (Mean = 3.15) display apprehension in the ethical and security aspects of AI use in the hospitality environments. Furthermore, the absence of clear policies or guidelines regarding guest data usage (Mean = 3.11) suggests the ambiguity of the governance frameworks for data usage related to AI. Lowest average response was found in terms of guest discomfort/ unwillingness to use A.I. based services (Mean=3.06), implying customer resistance has been perceived as relatively less important hurdle, compared with organizational & technical challenges. Overall the descriptive findings suggest that the barriers to adoption of AI in hotels is a multi-dimensional with managerial commitment, employee issues, financial limitations and data related issues identified as some of the most influential factors. Such insights do provide a good foundation to ask more analysis and hypothesis testing regarding the challenges in the adoption of AI, which are analyzed in further sections.

Table 1: Descriptive Statistics of Challenges and Barriers to AI Adoption

Item Code	Challenges & Barriers Statement	Mean	Std. Deviation
D1	High initial investment cost of AI-based systems (hardware, software, installation).	3.14	.840
D2	High ongoing costs of maintenance, upgrades, and licences for AI technologies.	3.15	.912
D3	Lack of suitable technical infrastructure (e.g., network, servers, devices) to support AI.	3.12	.921
D4	Difficulty in integrating AI solutions with existing hotel systems (e.g., PMS, POS, CRS).	3.14	.948
D5	Employees are resistant to using AI-based technologies in their daily work.	3.17	.944
D6	Employees fear that AI may lead to reduction or loss of jobs.	3.18	.913
D7	Lack of adequate training for staff to effectively use and manage AI systems.	3.13	.947
D8	Limited support or commitment from top management for AI adoption.	3.19	.899
D9	Concerns about data security and risk of cyber attacks or data breaches.	3.18	.942
D10	Concerns about guest privacy when using AI (e.g., cameras, voice assistants, data collection).	3.15	.931
D11	Lack of clear policies or guidelines on how guest data should be used with AI.	3.11	.909
D12	Guests are uncomfortable or reluctant to use AI-based services in the hotel.	3.06	.939

5.2. Hypothesis Testing and Comparative Analysis of Challenges to AI Adoption

To further examine the challenges and barriers affecting the adoption of AI-based technologies in hotels, comparative analysis was carried out to determine if there is any difference in perception of the barriers based on selected organizational characteristics. This analysis helps to find out whether some types of hotels or employee groups find it difficult to implement the AI technologies. According to the literature and research purposes, the following hypotheses were devised:

H1a: There is a significant difference in perceived challenges to AI adoption across hotel categories.

H1b: There is a significant difference in perceived challenges to AI adoption across hotel departments.

To put these hypotheses to test, an AI Adoption Barriers Score as a composite measure was calculated by item D1-D12 response means. This composite score is the overall level of the perceived difficulty around the adoption of AI.

5.3. Differences in Perceived Challenges to AI Adoption Across Hotel Categories (H1a)

In order to test the Hypothesis H1a which states that there is a significant difference in perceived challenges to adoption of AI across categories of hotels, Analysis of Variance (AOVA) which is one-way, was conducted. Hotel category (3-star, 4-star, 5-star and boutique hotels) was selected as independent variable while composite AI Adoption Barriers score (items D1 - D12) was selected as dependent variable

Table 2: Descriptive Statistics of AI Adoption Barriers across Hotel Categories

Hotel Category	N	Mean	Std. Deviation
3-star	63	3.194	0.932
4-star	48	2.858	0.329
5-star	224	3.091	0.531
Boutique	65	3.471	0.891
Total	400	3.141	0.68

Table 2 presents the descriptive statistics of the perceived barriers of the AI adoption in the different categorizations of hotels. The results indicate that there is a great deal of variation in the mean barrier scores between the categories of hotels. Among the four categories, perceived barrier is the highest for boutique hotels (Mean = 3.47) which indicates relatively more difficulty in implementation of AI based technologies for boutique hotels. Three-star hotels also showed relatively high levels of perceived barriers (Mean = 3.19) indicating that those hotels in the lower categories face significant problems that are associated with cost issues, staff preparedness, and system integration issues. In contrast, the mean barrier score of four-star hotels was the least (Mean = 2.86) indicating relatively fewer barriers towards AI adoption. Five-star hotels had a moderate level of perceived barriers (Mean = 3.09) which was in between four-star and hotels in lower categories.

Table 3: One-Way ANOVA Results for AI Adoption Barriers across Hotel Categories

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.648	3	3.883	8.906	0.000
Within Groups	172.651	396	0.436		
Total	184.300	399			

Overall, based on the results of our descriptive analysis, it appears that perceived issues that hinder the adoption of AI is not consistent across hotel categories. Lower-category and boutique hotels tend to face more barriers and hotels higher in the category - especially four-star properties - believe that the adoption of AI is relatively easy. These observed differences warrant the application of inferential analysis in the interest of statistically testing whether differences in perceived barriers between categories of hotels are significant, and this is addressed in the section that follows through the application of one way analysis of variance (ANOVA). Based on the Levene's test, the homoscedasticity hypothesis was not satisfied ($F = 22.266$, $p<0.001$). However, taking into consideration the robustness of the statistical test, namely the ANOVA used with large sample sizes as well as unequal groups, the analysis was considered appropriate to conduct hypothesis testing.

The results of one-way anova could be found in table 3 and it is revealed that there is a statistically significant difference between perceived AI adoption barriers in two categories which are hotels ($F = 8.906$, $p < 0.001$). The significant F-value indicates that there are significant difference in AI adoption perceived challenges among different categories of hotels.

5.4. Post Hoc Comparison

To get the defined categories of hotels that these differences occurred Tukey's HSD post hoc test was done. The resulting findings from a post hoc results show that there is a higher level of AI adoption barriers among Boutique hotels as compared to 4 star hotels ($p < 0.001$) and 5 star hotels ($p < 0.001$). 3 star hotels have a significantly higher barriers than 4 star hotels ($p = 0.040$). No significant differences between 3-star and 5-star hotels, nor was there any between 3-star and boutique hotels. The homogeneous subset analysis supports further the contention that the hotels that form a distinct group of 4-star hotels with the least perceived barriers and boutique hotels and hotels in the lower category forming clusters of perceived challenges. Based on the results of the ANOVA and post hoc, the Hypothesis H1a is accepted. The results show quite clearly that perceived challenges to adoption of AI are very variable across the hotel categories.

5.5. Difference in Perceived Challenges to AI Adoption Based on Hotel Department (H1b)

In order to examine Hypothesis H1b which stated that there are significant difference in the perceived challenges in adoption of AI among the various hotel departments, one way analysis of variance (One-way-ANOVA) was carried out. The department the employees work in was the independent variable and composite AI Adoption Barriers score (mean of items D1-D12) was the dependent variable.

Table 4: Descriptive Statistics of AI Adoption Barriers across Hotel Department

Department	N	Mean	Std. Deviation
Front Office / Reception	78	3.56	1.100
Housekeeping	43	3.07	0.490
Food & Beverage	82	2.97	0.300
Sales & Marketing/Revenue/Reservations	94	3.06	0.340
IT/ Systems / Engineering	82	3.12	0.660
Guest Relations / Concierge	21	2.89	0.670
Total	400	3.14	0.680

The descriptive statistics of perceived adoption barriers of AI for the various departments in the hotel are presented in Table 4. Employees working in the Front Office / Reception department showed the greatest level of perception of AI adoption barriers (Mean = 3.56, SD = 1.10). This suggests that there are significant difficulties faced by front-line staff with the use of AI, perhaps due to them being exposed to the use of AI-enabled systems on a regular basis, due to a rise in the pressure to deliver service, and/or due to an increase in the expectations associated with the reliability of systems. In contrast, the employees from

the Guest Relations / Concierge had the lowest mean barrier score (Mean = 2.89, SD = 0.67) closely followed by the Food & Beverage employees (Mean = 2.97, SD = 0.30). These lower mean values mean comparatively less perceived obstacles, most likely due to lack of direct dependency on the use of AI systems in daily operations. Other departments had moderate levels of perceived barriers such as Housekeeping (Mean = 3.07, SD = 0.49), Sales & Marketing / Revenue / Reservations (Mean = 3.06, SD = 0.34), IT / Systems / Engineering (Mean = 3.12, SD = 0.66). The overall mean barrier score obtained for all the departments was 3.14 which is judged as moderate extent of perceived challenges to adoption of AI into hotel operations. These results on mean scores would mean that department position might have an effect on the perception of challenges to AI and therefore justify the use of inferential analysis. According to Levene's test, the assumption of homogeneity of variances was not fulfilled ($F = 28.775$, $p < 0.001$). However, because the sample size is relatively large ($N = 400$) and the analysis of variance (ANOVA) is robust to such violations, the analysis was felt to be appropriate to hypothesis testing.

Table 5: One-Way ANOVA Results for AI Adoption Barriers across Hotel Departments

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.136	5	3.627	8.601	0.000
Within Groups	166.164	394	0.422		
Total	184.300	399			

The result of one-way comparison of Analysis of Variance in Table 5 indicates that there is a significantly higher difference in perceived barriers to AI adoption between the departments of the hotels ($F = 8.601$, $p < 0.001$). This confirms that the differences in mean barrier scores between departments is not an effect of random chance.

5.6. Post Hoc Comparison

To find the specific departmental differences Tukey's HSD post hoc test was conducted. The results of the post hoc analysis reveals that:

Example: - Front Office / Reception staff reported much higher barriers to AI adoption than:

1. Housekeeping (Mean Difference = 0.49, $p = 0.001$)
2. Food & Beverage (Mean Difference 0.59, $p < 0.001$)
3. Sales & Marketing / Revenue / Reservations (Mean Difference = 0.50, $p < 0.001$)
4. IT/ Systems/ Engineering (Mean Difference = 0.44, $p < 0.001$)
5. Guest Relations / Concierge (Mean Difference = 0.66, $p = 0.001$)

Sources of variation: Next we examine the results and infer conclusions about the sources of variation present in the general population. 2debaths.com responses. 8 NO statistically significant differences were observed between Housekeeping, Food & Beverage, Sales & Marketing, IT / Systems and Guest Relations departments ($p > 0.05$).

The homogeneous subset analysis further confirms that Front Office / Reception is a unique group with the highest perceived barriers while remaining departments bamboo with a comparatively low level of perceived challenges. Based on the results of the post hoc and the results obtained from the ANOVA, Hypothesis H1b is accepted. The findings clearly prove that there are significant differences between different hotel departments in terms of perceived challenges to the adoption of AI.

5.7. Summary of Findings for Objective

The aim of the objective was to study the important challenges and obstacles that are hindering the use of Artificial Intelligence (AI) in the hotels of Delhi at a large scale. The results show that hotels are confronting a variety of moderate yet persistent barriers in terms of organizational, technological, financial and human resource dimensions. The descriptive analysis showed that employees have a moderate understanding of the AI adoption challenges when they were asked in total, with approximate mean scores fell between 3.0 and 3.5 which consist of five points of scale for barrier items. Among the identified barriers, lack of support at the top management level, employee apprehension about their job security, high initial investment costs, continuous maintenance costs, data security risks, and lack of proper training were the foremost barriers. In comparison, guest resistance to the use of AI-based services was viewed as a lesser significant barrier.

Comparative analysis among categories of hotels showed some phenomenal differences in the perception of challenges in the adoption of AI. Boutique hotels had the highest amount of barriers reported and three-star hotels came close behind, meaning that more effort would need to go into implementing AI technologies due to limited resources and low technological infrastructure. Four

star hotels had the lowest level of perceived barriers and five star hotels faced moderate barriers which indicates that operational complexity and system integration problems are counteracting their higher financial and technological capability as well.

Department-wise analysis also showed that methods for AI adoption are looked upon very differently in different hotel functions. Front Office / Reception staff had the highest reported barriers as they are in contact with and therefore more exposed to breakdowns in operational systems and training limitations that are enabled by AI. Other departments such as housekeeping, food and beverage, sales and marketing, IT, and guest relations reported relatively low and more homogeneous proportions of perceived challenges. Overall, the results support the inferences that obstacles to adoption of AI technologies in hotels are not uniform and are shaped by both the category of the organizational role and the departmental role. These results indicate a need to develop AI adoption strategies at the level of the context: greater managerial commitment, targeted employee training and better change management practices, and technological support, which should be especially addressed for boutique hotels, as well as for hotels of lower categories and for front office employees. The insights produced under this objective form the critical basis of the discussion and managerial implications, presented in the next chapter.

6. CONCLUSIONS

The present study is based on the comparison of major challenges on the widespread use of Artificial Intelligence (AI) technologies in some of the selected hotels of Delhi. While AI has become a game changer in the hospitality industry - facilitating automaticity, personalization, predictive analytics, and improved work efficiency - results of this research has confirmed that its implementation is hampered by a number of organizational, financial, technological, and human-related barriers. The overall results demonstrate that the perceived barriers relating to adoption of AI is at a moderate but significant level. Although hotels have begun to use AI-enabled technologies such as automated front office systems, revenue management systems, and digital guest interfaces, it is not a seamless and uniform process. Between the most prominent barriers that were identified was lack of support by top management, employee concern about job security, high initial investment and maintenance costs, a lack of training to employees, and data security and privacy concerns. These results add to the argument that the introduction of AI in hospitality is not technological in nature but strategic and organizational change involving the commitment of leadership, the commitment of resources, and the preparation of the workforce. The results of the comparative analysis based on categories of hotels showed that, there were statistically significant differences in perceived barriers. Boutique and three-star hotels showed respect in the increase in problems that they had maximum challenges mostly because of financial constraints, infrastructural limitations and lower technological preparedness. In contrast, four-star hotels had relatively few barriers reported by them and five-star hotels had average difficulty, possibly due to complexity of operations and integration issues within larger systems. These results suggest that the category hotel is an important consideration in the implementation of AI adoption readiness, which in turn facilitates Hypothesis H1a.

Similarly, department-wise analysis showed that there was a great variation in the perceived challenges in hotel functions and therefore, confirmed Hypothesis H1b. Front Office / Reception staff reported the most substantiated level of perceived barriers; mirroring their direct interactions with AI-enabled systems and contact with operational disruption, training deficit, and service pressure. Other departments like housekeeping, food and beverage, sales and marketing, IT and guest relations had comparatively less and more homogenous perceptions of barriers. This points out the fact that the adoption of AI have different impacts on various department, is based on the way, they function and the level of interaction with technology. Collectively, the findings highlight that the process of adoption of AI in hotels is a multidimensional change process in organizations rather than a technology upgrade. Successful implementation requires determination of good managerial commitment, organised change management, targeted training initiatives, clear data governance policies and department specific integration strategies. The study adds to the body of research in studies on hospitality industries, by empirically presenting that there is a significant variation in the perception on barriers towards adoption of Artificial intelligence for all categories of hotels and departments, this poses the nuanced information about organizational readiness in Delhi hospitality market. In conclusion, while the potential applications of AI in hotels are quite astonishing and promising, in order to be successful and sustainable, it is important to consider the contextual, structural, and human factors involved in its implementation. Policymakers and hotel

management must thus adopt differentiated and inclusive approaches to enhance digital-readiness, establish trust among employees and ensure ethical and safe integration of AI to reap all its potential benefits in the hospitality sector.

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